

REMARKS

It is proposed that FIG. 5 of the drawings should be cancelled. The description of FIG. 5 has been deleted from the specification. Cancellation of FIG. 5 and deletion of the corresponding description if without prejudice to applicant's right to file a continuing application directed to this subject matter.

The examiner has objected to the drawings. It is believed that the proposed amendments for the drawings provide a full response to the objections.

Claims 1, 10 and 16 stand rejected under 35 USC 102 or 35 USC 103 over Itoh et al or JP 48-27263, and claims 12-15 stand rejected under 35 USC 103.

The present invention, as defined in claim 1, is concerned with a cooling element used in a heat exchanger in which the cooling medium flows inside a circulating element to which the cooling element is bonded. The cooling element is provided with louvers and the angle of the cooling element to the longitudinal direction of the circulating element and the angle of the louvers to the surface of the cooling element are substantially equal in magnitude.

Claim 17 covers the structure shown in FIGS. 3a and 3b but defines the various angles more narrowly than claim 1.

Claim 22 is directed to the structure shown in FIG. 4. Claim 22 is generally similar to claim 17 but recites that the cooling element is composed of first and second portions and separately defines the relationships pertaining to the first and second portions of the cooling element.

Itoh et al discloses a heat exchanger in which gaseous fluid flowing through a tube 2 is cooled by air flowing over the exterior of the tube 1 in contact with a fin assembly 4 composed of fins 4A, etc. provided with louvers 6. FIG. 3 shows that the direction 7 of air flow through the fin assembly 4 is at an angle γ to the louvers and that the fins 4A, 4B, etc. are at an angle θ to the direction 7. Thus, the teaching of Itoh et al is concerned with the relationship of the inclination of the fin and the inclination of the louver to the direction 7 of air flow.

In accordance with Itoh et al, the angle of the louver to the fin is $(\theta + \gamma)$. It is evident from FIG. 1 of Itoh et al that the direction of flow of gaseous fluid through the tube 1, i.e. the longitudinal direction of the tube 1, is perpendicular to the direction 7 and therefore the fin is at an angle $(90-\theta)$ to the direction of the flow in the tube 1. In order to meet the

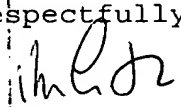
limitations of the independent claims, Itoh et al would have to show the angle $(90-\theta)$ should be substantially equal to the angle $(\theta + \gamma)$. Itoh et al does not disclose or suggest that the angle $(90-\theta)$ should be substantially equal to the angle $(\theta + \gamma)$.

JP 48-27263 appears to disclose a heat exchanger in which a cooling element 3 is attached to circulating elements 1. FIGS. 6 and 7 show details of the cooling element 3, formed with louvers. JP 48-27263 does not disclose or suggest that the angle of the louvers to the fin is substantially equal in magnitude to the angle of the fin to the longitudinal direction of the circulating elements.

The examiner suggests that selection of the angles of the louvers and fins is a mere matter of design choice and that an increase in the angle relative to the air flow increases the pressure drop and the heat exchange. Applicant submits that the situation is not so clear cut, since the behavior of the heat exchanger also depends on the speed of air flow, as described with respect to FIG. 1. The present invention is not concerned merely with selecting an angle for the louvers or for the fins but with the realization that it is desirable that the two angles should be substantially equal in magnitude. This feature is not disclosed or suggested by the prior art.

In view of the foregoing, applicant submits that the invention defined in the independent claims 1, 17 and 22 is not disclosed or suggested by Itoh et al and JP 48-27263, whether taken singly or in combination. Therefore, the independent claims are patentable and it follows that the dependent claims also are patentable.

Respectfully submitted,



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